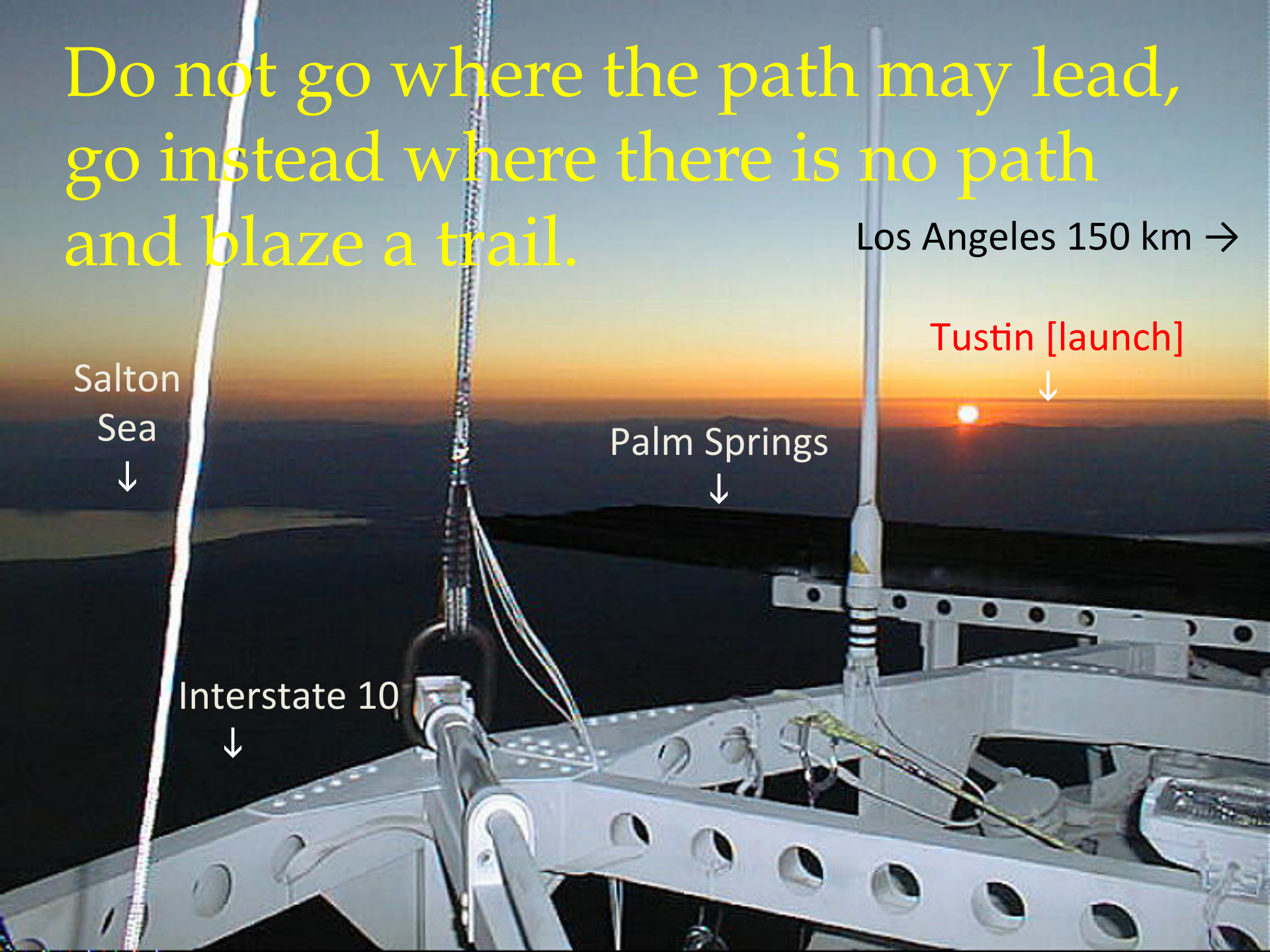

Do not go where the path may lead, go instead where there is no path and blaze a trail.
Los Angeles 150 km →
Tustin [launch]
↓
Salton Sea
↓
Palm Springs
↓
Interstate 10
↓

"Apollo Expeditions to the Moon" 1975

Purposely written "after the cheering had subsided but while memoirs where sharp".


The First golden age.
Pierre Testu-Brissy 1798
Simply amazing to fly!
Bibliothèque nationale


Charles Green
1835 / 1836

Thaddeus Lowe 1859

Andrée from Svalbard 1897

The saddest flight ever


DOUBLE EAGLE II

Flight of the

Pacific Eagle

Pacific crossing, distance stood for 17 years: a bold flight.


FISONS
Explorer

Earthwinds

Larry Newman

$20 million?

Five failures 1992/4

But the NCAR Sky Anchor failures are in the literature.

THE INDEPENDENT.

Wednesday 10 December

Font page.

"If *The Simpsons* were going on a round-the-world balloon trip, it would start like this: the balloon soring into the sky, Homer saying "Doh!" and the would-be occupants left behind ….. "

Eight balloon teams are preparing to be the first to circumvent the world by balloon.

Who's On First?

by Tom Hamilton

On the following pages each of the current around-the-world teams are reviewed. The challenges faced by each can be divided into four general categories.

The four barriers standing in the way for all attempts are: The first is weather, particularly in the northern hemisphere. Each team's meteorologist must be able to fine a succession of weather systems that will get the team around the globe. In any one season that may never happen. Weather stopped Steve Fossett this past summer. Second, the equipment must hold up for the entire flight. Most attempts have failed due to equipment problems. Third, the pilots themselves must be up to the task—mentally and physically. Fourth, the political environment in the northern hemisphere can be a bigger stumbling block then the first three.

Below is a short review of those who have tried to be the first.

Those that made into the air:

1. *Jules Verne*, January 12, 1981. Maxie Anderson and Don Ida launch from Luxor, Egypt. Balloon steadily lost gas and landed at Hansa, India, 2676 miles and 48 hours later.
2. *Jules Verne*, December 20, 1981. Maxie Anderson and Don Ida continue their quest, launching near their previous landing spot. Balloon develops bad leak early and lands after 20 miles flight.
3. *Jules Verne*, November 7, 1982. Maxie Anderson and Don Ida make a third attempt, this time from the Stratobowl, South Dakota. Balloon developed a leak and the flight was terminated before crossing the Atlantic. 1162 miles, 16 hours.
4. *Earthwinds*, January 13, 1993. Larry Newman, Vladimir Dzhanibekov, and Don Moses launch from Stead Airfield near Reno, Nevada. 30 minutes and seven miles into the flight the lower ballast balloon is torn when the system fails to clear a mountain top. The flight is terminated.
5. *Earthwinds*, January 12, 1994, Stead Airfield. Larry Newman, Richard Abruzzo, and David Melton take off on another attempt. Flight aborted because valve in lower ballast balloon is frozen. 202 miles, 6 hours 54 minutes.
6. *Earthwinds*, December 31, 1994, Stead Airfield. Larry Newman, David Melton, and George Saad reach 31,000 feet and the ballast balloon pops on New Year's Eve. 100 miles, four hours.
7. *Global Challenger*, January 15, 1996, Stratobowl, South Dakota. Steve Fossett's first attempt runs into trouble soon after takeoff when the mylar skin begins to come off the envelope. Other problems develop and he lands in Newfoundland, Canada two days later.
8. *Virgin Global Challenger*, January 7, 1997, Marrakech, Morocco. Richard Branson, Per Lindstrand, and Alex Ritchie are advised after liftoff that the ground crew had not unlocked fittings to the fuel tanks. Balloon is allowed to descend that night to depressurize and fix the problem. Caught in a severe rotor almost all ballast is expended to keep from crashing. The balloon lands after daylight in Algeria. 20 hours.
9. *Breitling Orbiter*, January 12, 1997, Chateau d'Oex, Switzerland. Bertrand Piccard and Wim Verstraeten run into problems soon after launch when a 50 cent metal hose clamp failed and kerosene fumes leak into the gondola. A decision is made to land in the Mediterranean Sea. The envelope is jettisoned. The capsule and crew are towed to port.
10. *Solo Spirit*, January 13, 1997, St. Louis, Missouri. Steve Fossett comes closer than any previous attempt when he lands in India. The balloon's planned fuel capacity proved to be too little. 10,361 miles, 146 hours, 54 minutes setting new absolute balloon records for distance and duration.
11. *Virgin Global Challenger*, December 9, 1997, Marrakech, Morocco. The Virgin team gambles they can attach the gondola to the inflated envelope under marginal conditions. Before that can be accomplished the envelope breaks loose and flies away.
12. *Solo Spirit*, December 31, 1997, St. Louis, Missouri. Steve Fossett takes off on his third attempt. He completes the fasting crossing of the Atlantic, but dumps one tenth of his fuel to climb over bad weather. Trying to maneuver around Libya he loses the best weather track. One of his burners is acting up and heater fails. Finally with nowhere to go he lands in Russia near the Black Sea. 7300 miles, 146 hours, 44 minutes.
13. *J. Renée*, December 31, 1997, Rockford, Illinois. Kevin Uliassi launches hours after Fossett. Has he reaches 19,000 feet the gas cell of his Roziere balloon ruptures. He is able to make a dramatic night landing with help of a helicopter and assistance from ground personnel.
14. *Hilton Global Challenger*, January 9, 1998, Albuquerque, New Mexico. Dick Rutan and David Melton reach cruise altitude around 29,000 feet. The gas cell, with the same design of Uliassi's, ruptures. After two hours of discussions with ground crew and inflight evaluation the pilots bail out. The balloon system contacts the ground and then flies on. Eventually the balloon contacts powerlines and is destroyed in a fire north of Dallas, Texas.
15. *Breitling Orbiter 2*, January 28, 1998, Chateau d'Oex, Switzerland. Bertrand Piccard, Andy Elson, and Wim Verstraeten lift off. The potential flight had been delayed when the capsule was dropped during unloading on January 8 and had to be repaired. Elson makes dramatic outside the capsule repair over Mediterranean. Crew also ballast some fuel over water. China had first denies permission and the balloon finds some slow winds to stall. Although China eventually gives permission the team no longer has the necessary duration capability. The balloon lands in Thailand setting a new duration record of 233 hours, 55 minutes.
16. *Solo Spirit*, August 7, 1998, Mendoza, Argentina. Fossett takes off for the fourth time and first southern hemisphere flight. An early fuel problem causes an onboard fire. Fossett is able to continue. Meteorologist Bob Rice threads the balloon through a needle over the Indian Ocean. Fossett crosses Australia in record time and looks to be on his way. There is concern over his remaining oxygen supply, but the flight comes to a watery end when the balloon can not climb over a thunderstorm. Pulled down into it the envelope is ripped and Fossett makes a hard water landing. Rescued he has filed a claim for a new distance record of 22,975 kilometer (~14,267 miles) and joined the Richard Branson-Per Lindstrand *ICO Global Challenge* team.

Those that tried to launch:

1. *S.H.A.R.E.*, March 1988. John Petrehn and Towland Smith to launch from Mendoza, Argentina using a double helium balloon attached above a hot air balloon envelope. One of the helium balloons is torn during inflation.
2. *Earthwinds*, February 21, 1992. Larry Newman's figure eight looking helium/ballast balloon is inflated and rolled out of a blimp hangar in Akron, Ohio. Winds off of Lake Erie cause the launch to be scrubbed. Co-pilots were Richard Branson and Vladimir Dzhanibekov.
3. *Earthwinds*, November 5, 1993, Stead Airfield. During inflation one of four anchor bolts holding the system to the ground breaks loose causing equipment damage.

Autumn 1998

"eight teams preparing"


AEROSTAT
THEY'VE DONE IT!
March 1999
BREITLING
ORBITER 3

Cable and Wireless
18 days
19,700 km

Breitling
19.4 days
40,800 kilometers

Virtually identical balloons and times, totally different outcomes. Lesson? ***Forecasting perhaps?***

After FIVE failed attempts, Steve Fossett, decided to use the forecaster Breitling had used.

He immediately flew round the world successfully.

Forecasting perhaps?

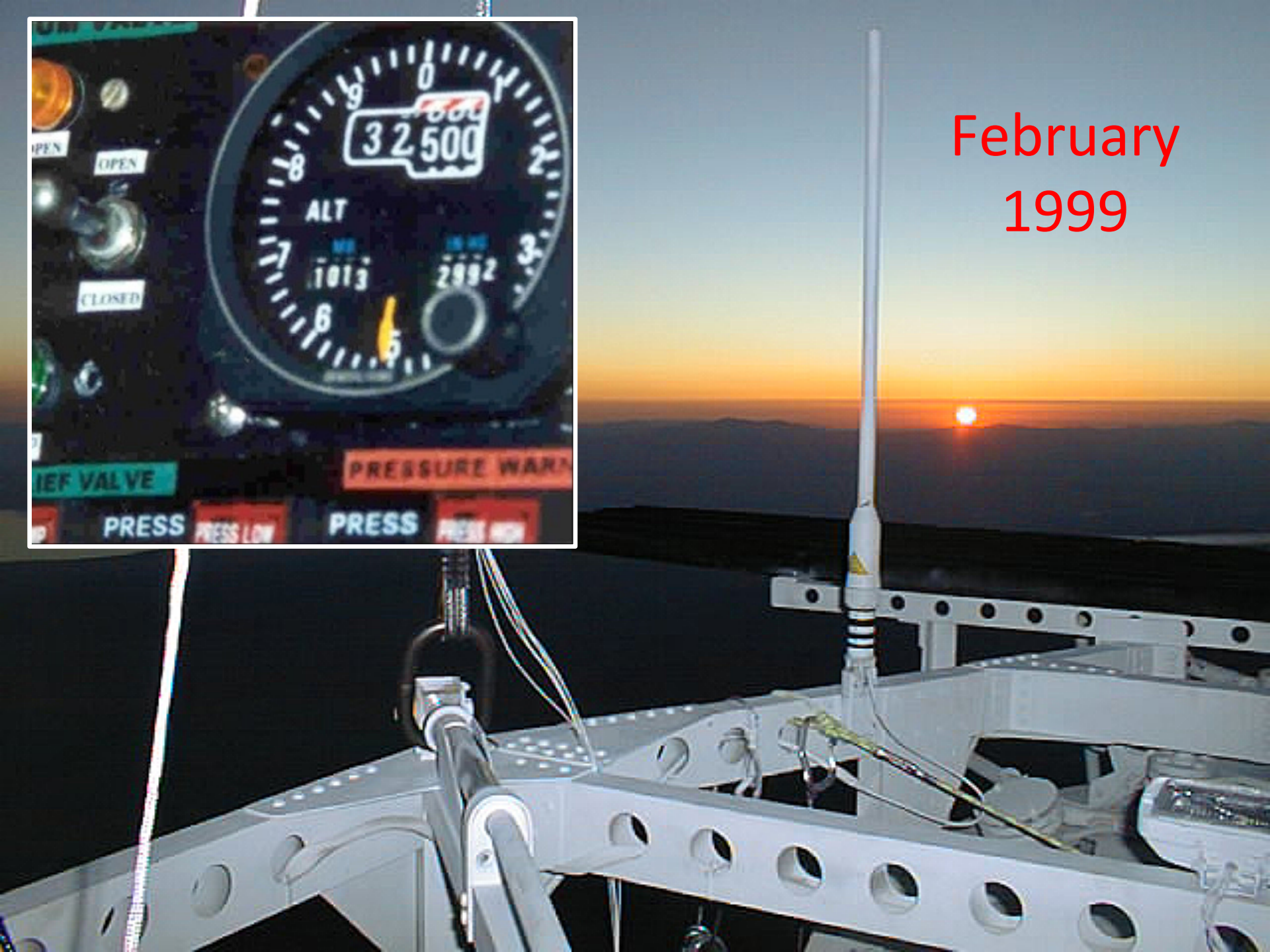
Essential to use the right forecasters.

The bold attitudes in the world race were totally removed from normal experimental flying, military flying, civilian flying and only a lesson in what not to do.

By contrast JPL has a rigorous development program.

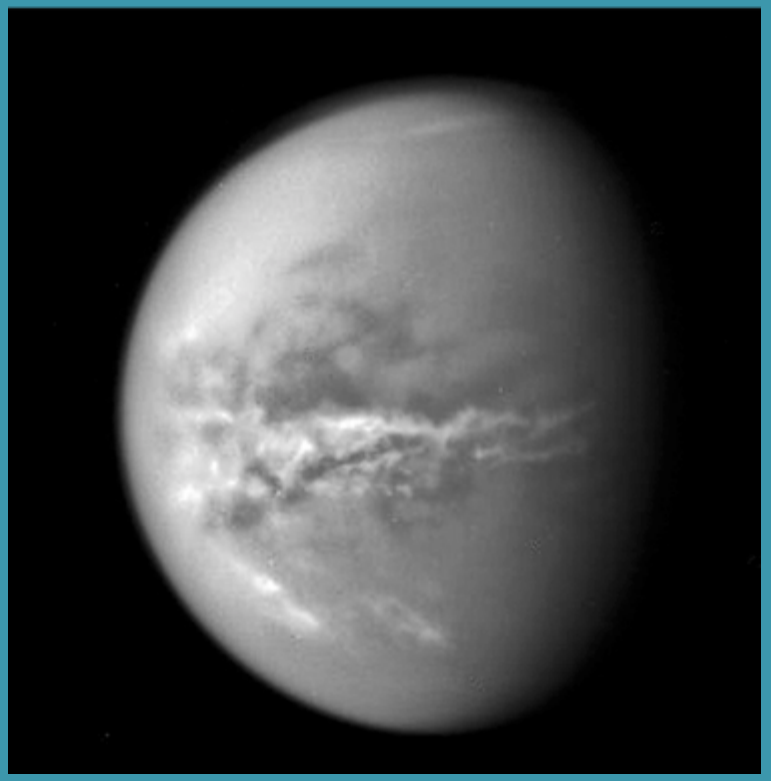

SETP


Kiln
BOC GASES


32500
ALT
1013
2992
OPEN
CLOSED
PRESS
PRESS
February
1999

Forecasting perhaps?

An insight: both Titan sailors and balloonists must understand Titan weather. It would be valuable to have a "Titan Weather Workshop" to bring together several relevant disciplines.



A notable Titan weather event.

Image courtesy Dr Ralph Lorenz

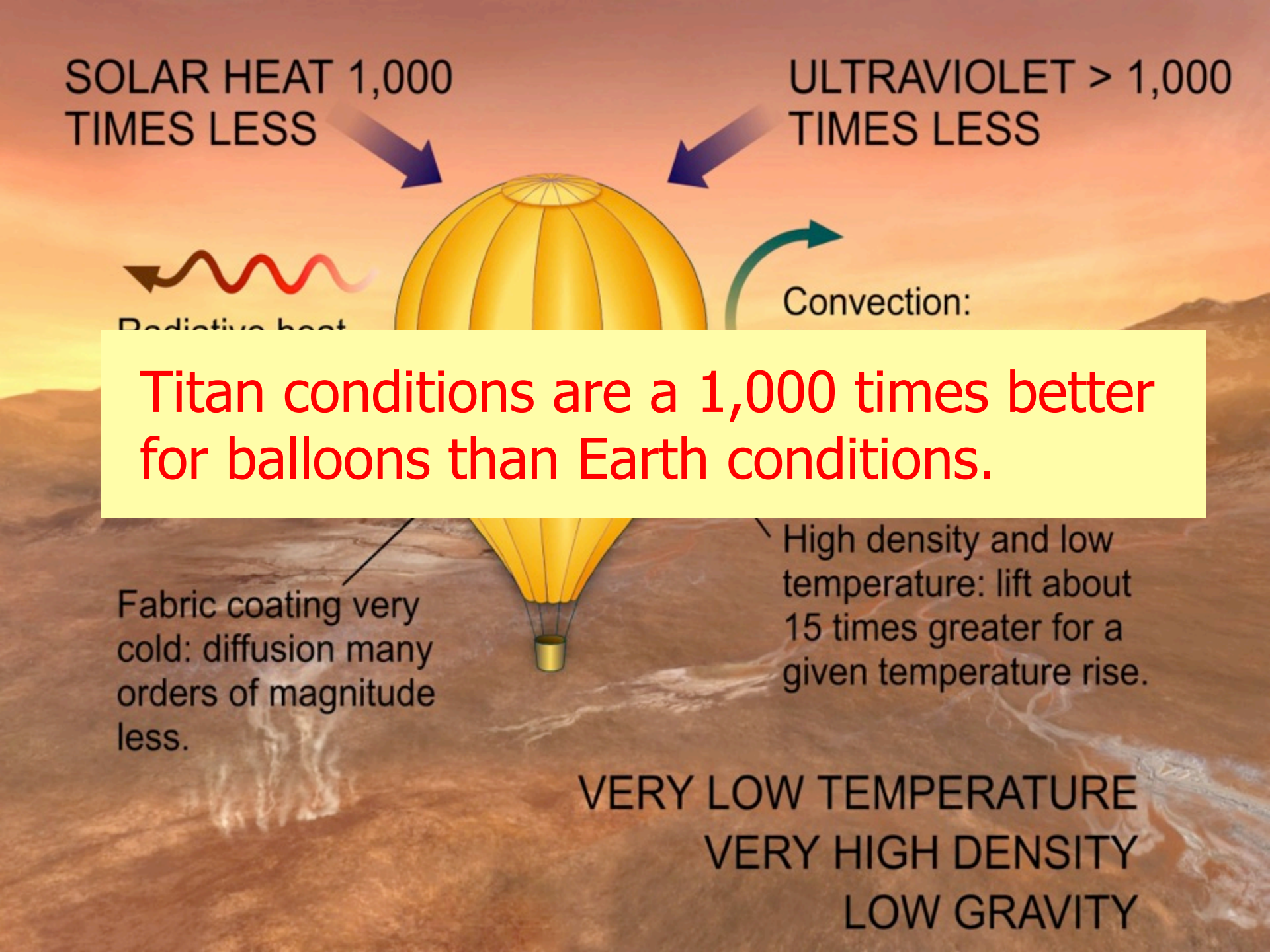
Why balloons for Titan?

To this audience it is obviously a fabulous destination.

Space scientists think balloons are risky. Not so, at least 100 million weather balloons and larger have flown. Balloons are very familiar. The only difference is they arrive by rocket.

Titan & Venus conditions are within terrestrial experience.

Balloons are very simple: Pilâtre de Rozier flew an astonishing 178 years before Yuri Gagarin.


SOLAR HEAT 1,000 TIMES LESS
ULTRAVIOLET > 1,000 TIMES LESS
Convection:
Titan conditions are a 1,000 times better for balloons than Earth conditions.
High density and low temperature: lift about 15 times greater for a given temperature rise.
Fabric coating very cold: diffusion many orders of magnitude less.
VERY LOW TEMPERATURE
VERY HIGH DENSITY
LOW GRAVITY

Artist conception of Hotei Arcus region of Titan.

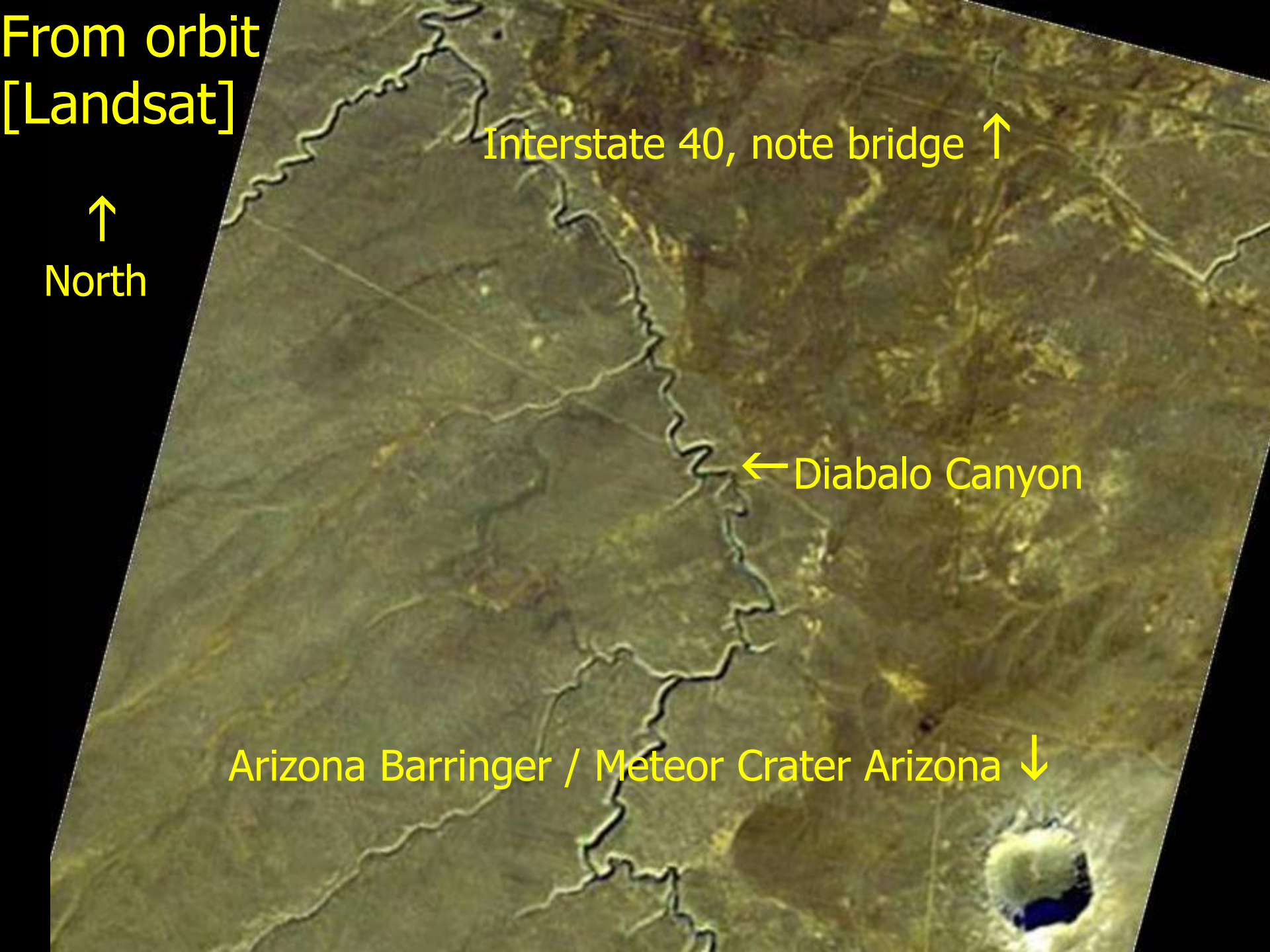
Scientifically fascinating .... but .... No place for wheels

However balloons can go anywhere!

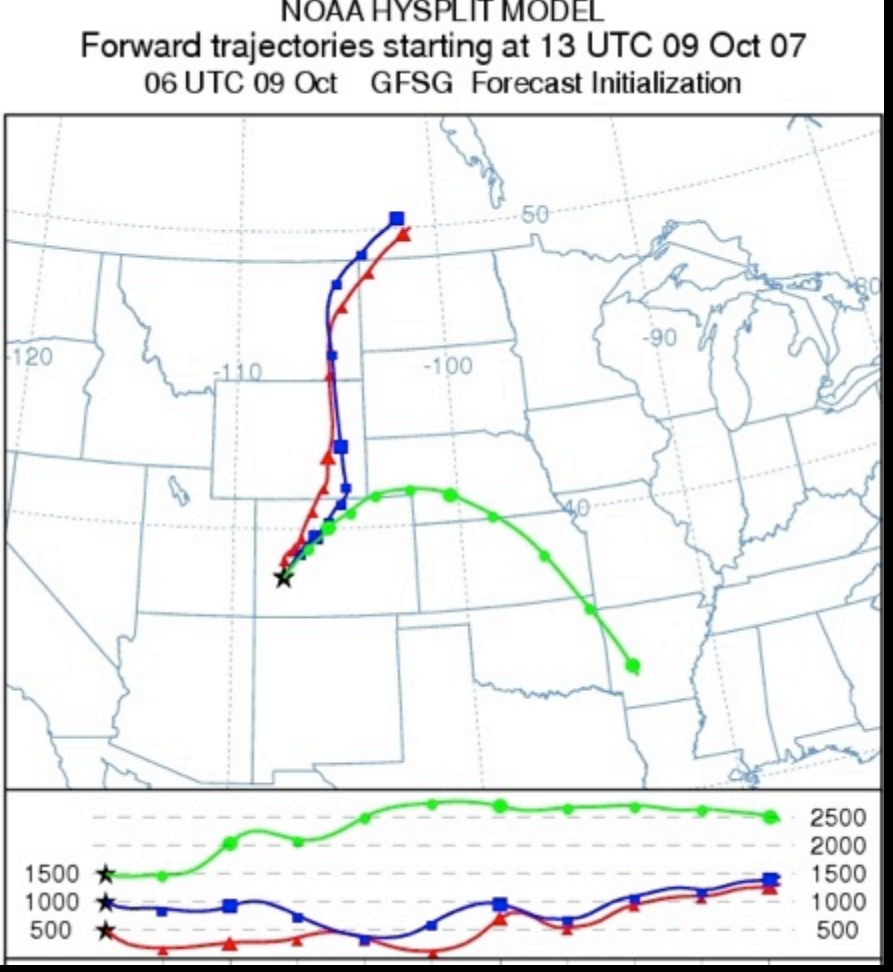
This balloon is shown crossing the shore, likely a very interesting area but impossible for Rovers to reach.

Balloons can fly from a meter above the surface to ten kilometers: unlike Rovers they can see beyond the hills.

"The Black Cloud problem." Balloons can change altitude to see "weird life" no matter what scale it may be.


From orbit
[Landsat]
↑
North
Interstate 40, note bridge ↑
←Diabalo Canyon
Arizona Barringer / Meteor Crater Arizona ↓


Copyright Keith Sproul Meteor Crater 2008

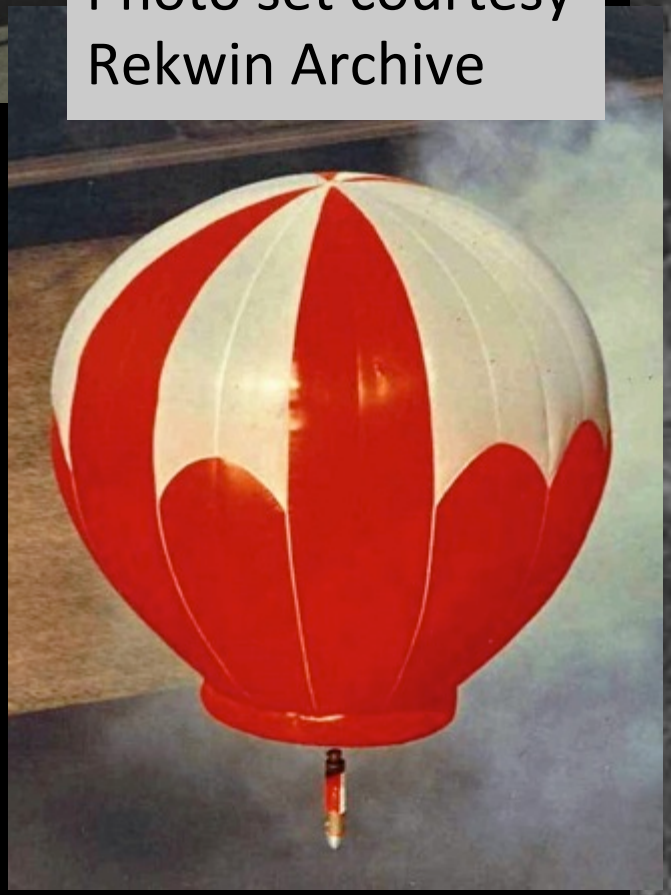


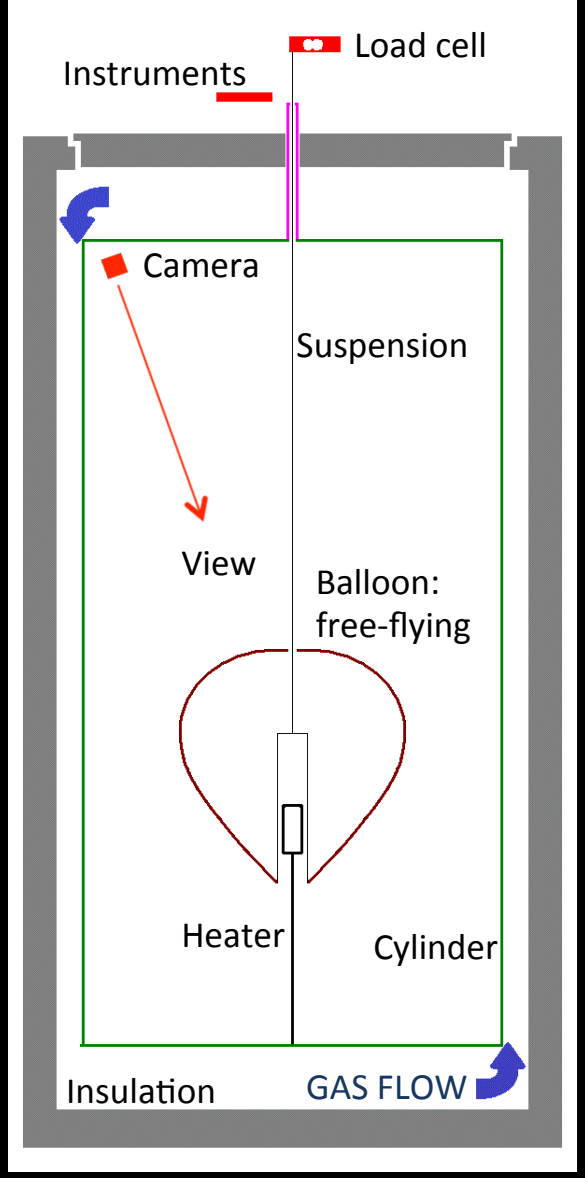
Continental scale

"Autonomous" over 10 kilometers

STEERING

Photo set courtesy
Rekwin Archive

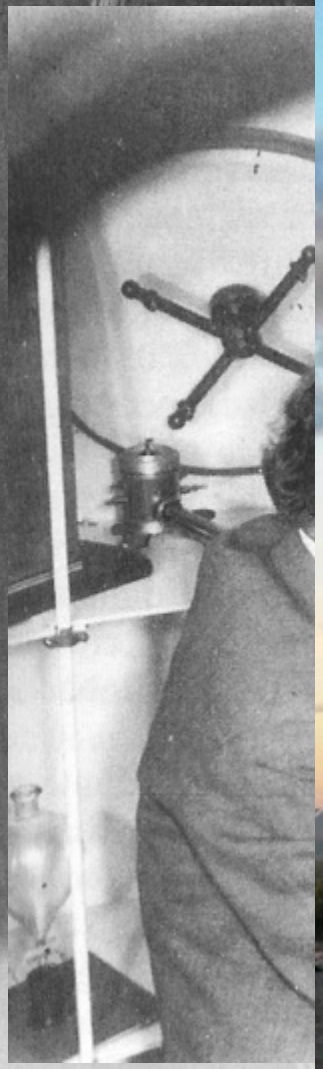




Titan is very cold but rather easy to simulate:
The Titan Sky Simulator™

Camera looking down on balloon flying at *minus* 180C.

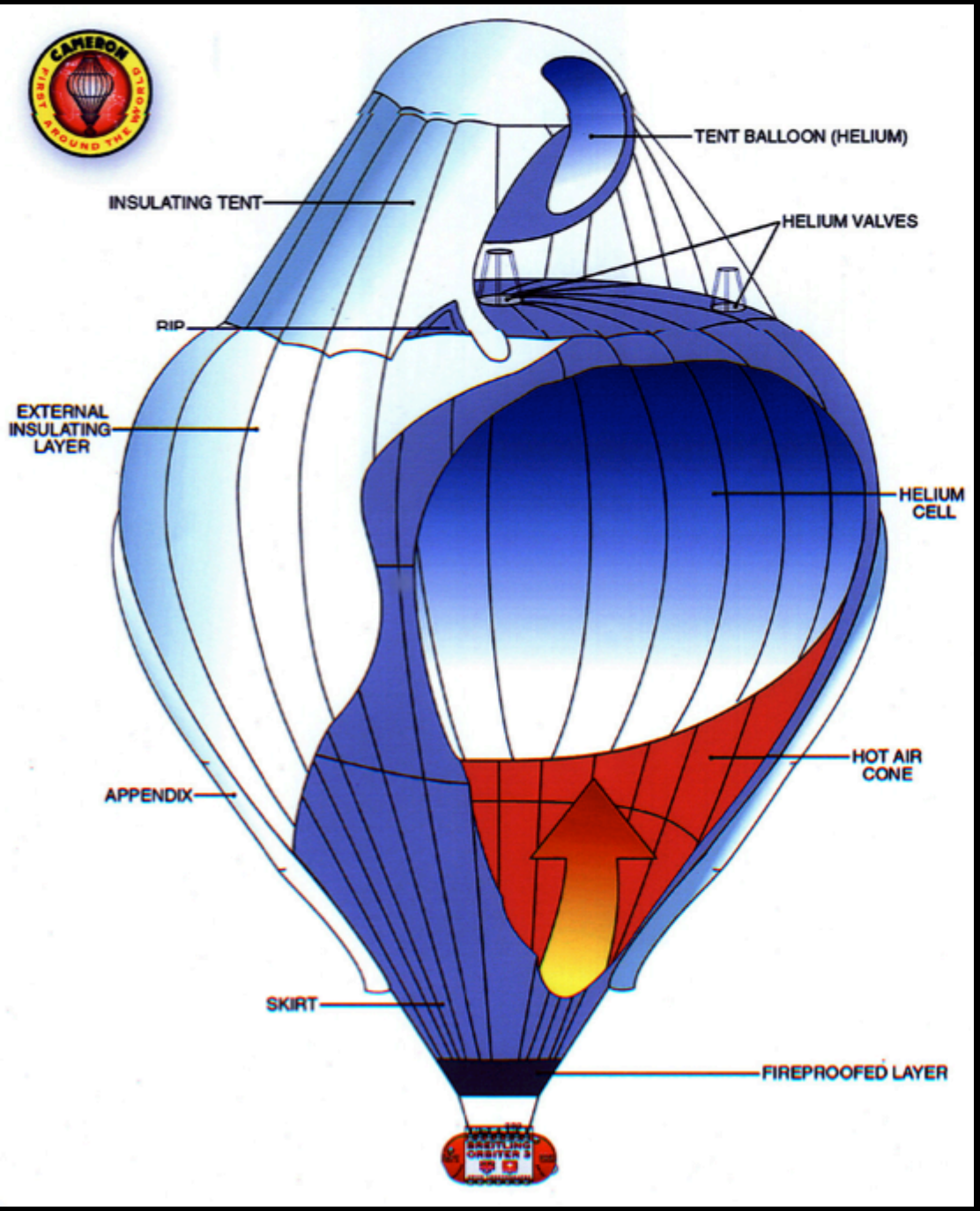
J^ph L^is GAY-LUSSAC
(Physicien et Chimiste),



Heroes versus organizers

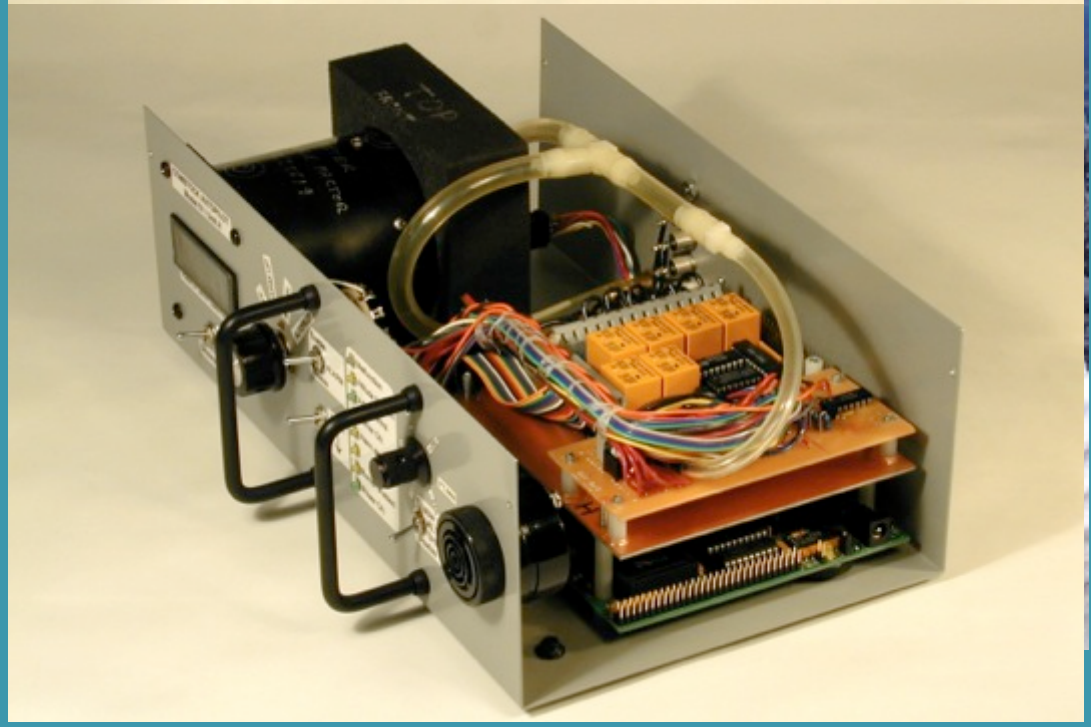
Neil Armstrong…

Don Cameron
Alan Noble
Bruce Comstock
Luc Trullemans



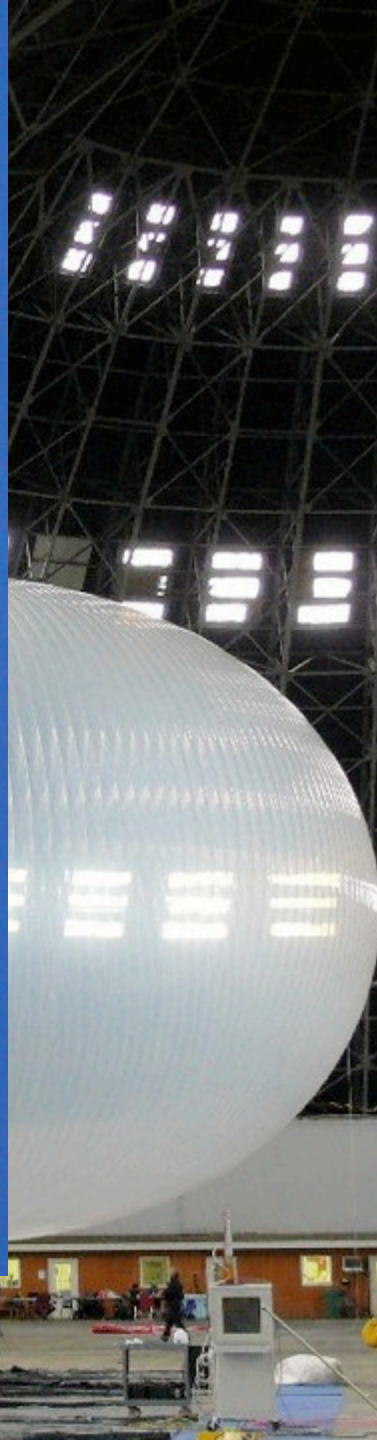
"Complex" balloons are very practical. But the most complex balloon it trivial compared to the simplest spacecraft.

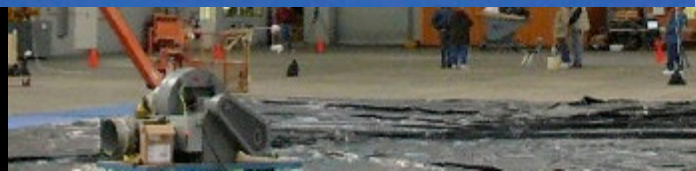
Fabric cost less than Plutonium-238.

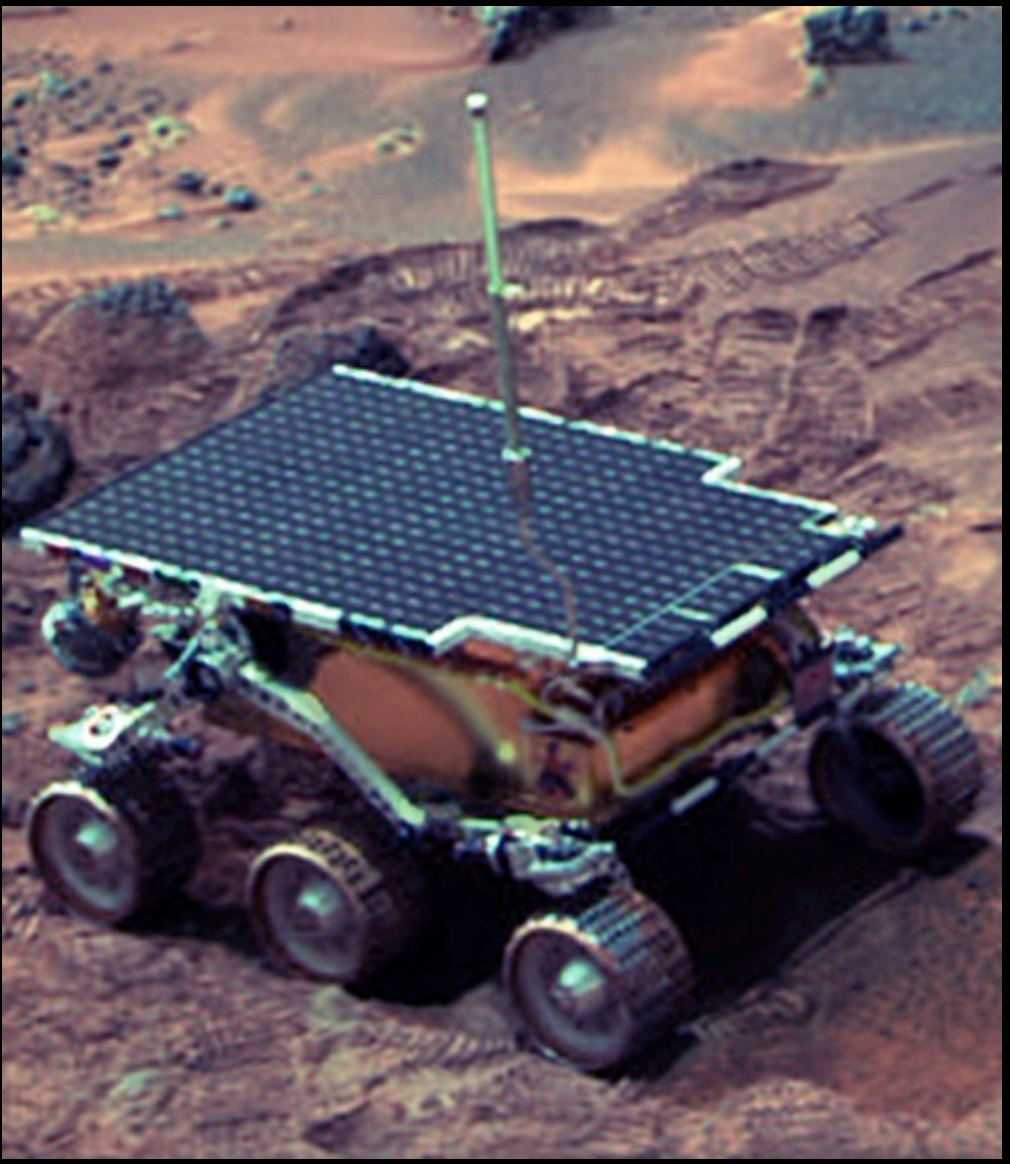


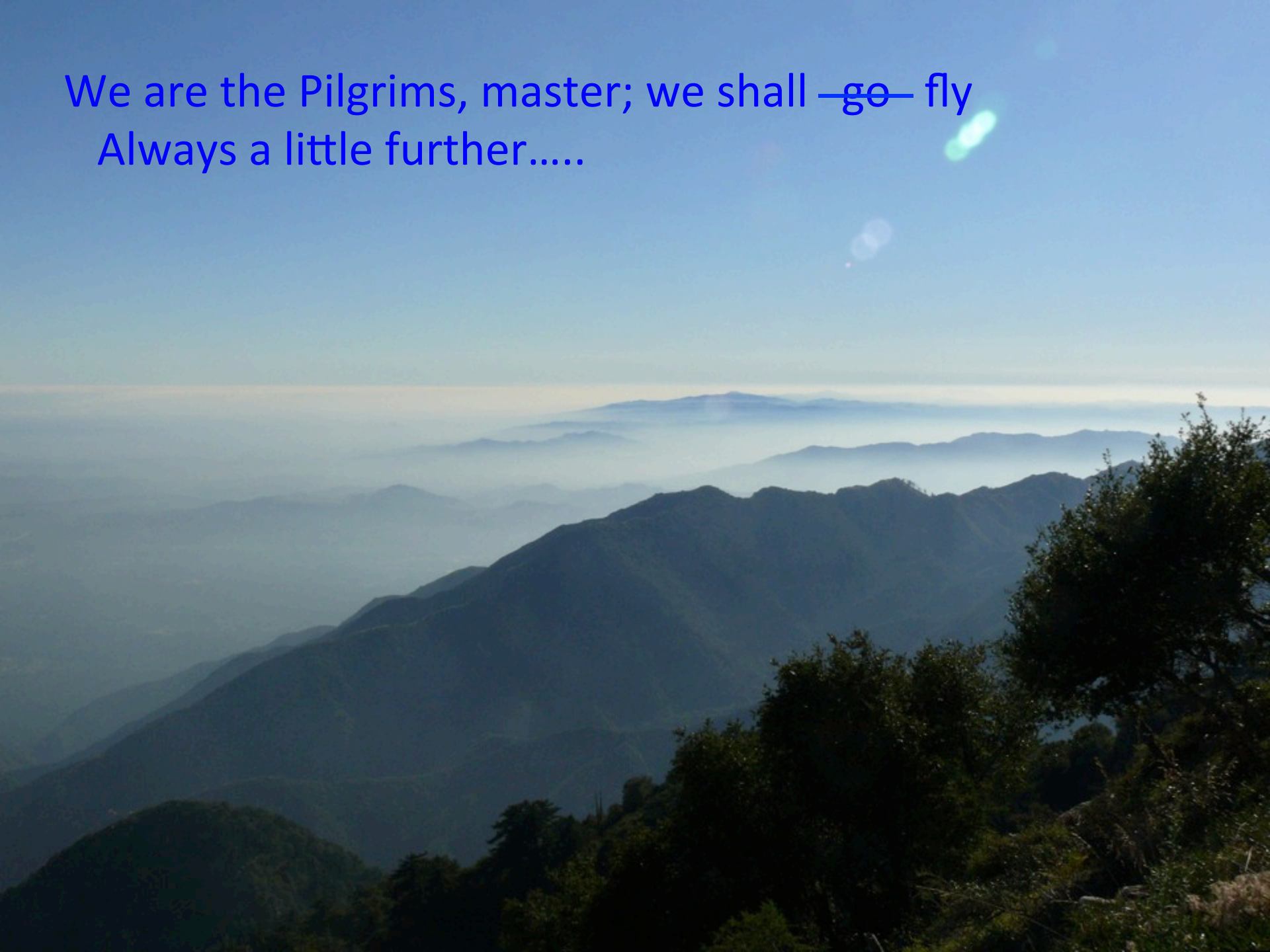
Steve Fossett very publicly stated that he could not have flown around the world without Bruce's autopilot.

At 110,000 ft: telescope picture








We are the Pilgrims, master; we shall ~~go~~ fly
Always a little further…..

Julian Nott, Don Cameron, Bruce Comstock Kevin Uliasi

Contact Julian Nott, Nott Technology LLC, Santa Barbara, CA, USA
nott@nott.com +1.805.708.8100

Special thanks to Dr Jeff L. Hall & the NASA Jet Propulsion Laboratory